

following papers will be read :—Dr. Maddox : On the Feeding of Insects with Bacilli. Mr. T. B. Rossiter : On the Gizzard of the Larvæ of *Corethra plumicornis*.

ARRANGEMENTS are being made for the establishment of a Zoological Garden in Christiania.

DURING last week a series of experiments were carried out upon North Sea trawling vessels with a view to lighting them by electricity. The attempt was on the whole satisfactory. The introduction of electric light into fishing-boats would prove invaluable, but the heavy expenditure involved in such a scheme would exclude its general usage.

THE United States Fish Commission report a great decrease in the halibut and cod fisheries of America. The cause for this is attributed either to low temperatures of water or the destruction of fry by reckless fishing. A general falling off of flat-fish is reported from Germany this year, and a diminution in the herring fishery is recorded from Belgium. The increased number of fishermen off Holland and the destruction of immature fish has produced a bad effect upon the fishery of that place.

THE National Fish Culture Association have made arrangements to import a large consignment of carp from Germany for the purpose of acclimatising them to the waters of the United Kingdom. Numerous applications have been made from all parts for supplies of these fish, which are far superior to our own species. In Germany, China, France, and America carp farming is extensively prosecuted with highly satisfactory and remunerative results.

WE have received the report for the summer session of 1885 of the Queenwood College Mutual Improvement Society. It describes in detail the various excursions of the session, and would make an admirable guide for the parts of Hampshire and the Isle of Wight visited.

WE have received from the author a pamphlet containing a geological sketch of the Island of Antigua, by Mr. Purves, which was originally contributed to the *Bulletin* of the Royal Museum of Natural History of Belgium. Prior to this paper the only information on the subject was contained in a paper by Dr. Nugent, published in 1819, and by Prof. Hovay, published in the *American Journal of Science* in 1839. The pamphlet is illustrated by a geological sketch map.

THE Queen has been pleased to grant to Prof. W. Chandler Roberts, F.R.S., of the Royal Mint, authority to use after his paternal name the name of his uncle, the late Major N. L. Austen, J.P., of Haffenden and Combourn, in the county of Kent.

THE additions to the Zoological Society's Gardens during the past week include a Toque Monkey (*Macacus pileatus* ♂) from Ceylon, presented by Mr. Septimus Smith; a Green Monkey (*Cercopithecus callitrichus* ♂) from West Africa, a Macaque Monkey (*Macacus cynomolgus* ♀) from India, presented by Mr. S. T. K. D. Potter, F.R.G.S.; six Indian Fruit Bats (*Pteropus medius*) from India, presented by Mr. W. Jamrach; two Canadian Skunks (*Mephitis mephitis*) from North America, presented by Dr. C. Hart Merriam, C.M.Z.S.; a Common Badger (*Meles taxus*), British, presented by Lord Egerton of Tatton, F.Z.S.; a Ring-necked Parrakeet (*Palaornis torquata*) from India, presented by Mrs. Douglas; a Common Barn Owl (*Strix flammea*), British, presented by Miss Linda Raven; two Common Guinea-Fowls (*Numida cristata*), British, presented by Mr. C. H. Hopwood, M.P.; a Loggerhead Turtle (*Thalassochelys caouana*) from the Atlantic Ocean, presented by Mr. A. Duncan Fraser; four Hog-nosed Snakes (*Heterodon platyrhinos*), a Say's Snake (*Coronella sayi*), two — Snakes (*Coluber alleghaniensis*), an American Black Snake (*Coluber constrictor*) from

Indiana, North America, presented by Mr. F. J. Thompson; a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, a Great Bird of Paradise (*Paradisea apoda*) from the Aroo Islands, a Common Cormorant (*Phalacrocorax carbo*), British, an Emu (*Dromæus novæ-hollandiæ*) from Australia, a Gigantic Salamander (*Megalobatrachus maximus*) from Japan, deposited.

OUR ASTRONOMICAL COLUMN

THE SATELLITES OF URANUS AND NEPTUNE.—In Appendices I. and II. of the Washington Observations for 1881, Prof. Asaph Hall has published the results of his investigation of the orbits of the outer satellites of Uranus, *Oberon* and *Titania*, and the satellite of Neptune. The satellites of Uranus were amongst the first objects observed with the 26-inch refractor of the Naval Observatory, after it was mounted in November, 1873. The first series during the oppositions of 1874 and 1875 were discussed by Prof. Newcomb, with the view to the determination of the mass of the planet, and the formation of tables of the motions of the satellites, which were published in the Washington Observations for 1873. Remarkable that as the earth would be nearly in the plane of the orbits in the year 1882, and observations made about that year would probably afford a good determination of the position of this plane, Prof. Hall commenced a new series in March, 1881, which were continued through the four oppositions until the end of May, 1884; these observations were made with magnifiers of 606 and 888; in fair conditions of the atmosphere the outer satellites are stated to be easily observable with the Washington instrument. A comparison of the measures with Prof. Newcomb's tables showed that those tables required but small corrections, which were found by equations of condition in the usual manner. It should be mentioned that the tables were founded mainly upon Prof. Newcomb's own measures; those by Prof. Hall in the years 1875 and 1876 are included in his recent discussion.

For the position of the nodes and inclination of the orbits of the satellites, Prof. Hall finds—

$$N = 165^{\circ} 81' + 0^{\circ} 0142t$$

$$I = 75^{\circ} 30' - 0^{\circ} 0014t$$

t being the number of years from 1883.0.

The mean value of the mass of Uranus by the observations of

Oberon is $\frac{1}{22603}$, and by those of *Titania*, $\frac{1}{22833}$, or, combining

the values with their respective weights, the final result is $\frac{1}{22682}$.

This value, though somewhat smaller than those previously obtained, Prof. Hall thinks is as good as he could obtain with the filar-micrometer of the large refractor, and he does not consider that there would be much gained by a continuation of the measures. He mentions that during the oppositions of the planet from 1881 to 1884, which were especially favourable for the search after new satellites, he made careful examination on several good nights along the orbit plane of the known satellites, without finding any new ones.

The orbits of *Oberon* and *Titania* appear to be sensibly circular.

Prof. Hall's discussion of the elements of the orbit of the satellite of Neptune is founded upon his own observations during the oppositions of 1875 and 1876, and those of 1881–84; in addition, he has made use of Prof. Holden's measures in the interval 1874 December–1878 November, and has also discussed those of Lassell and Marth taken at Malta in 1863 and 1864. Prof. Newcomb's elements are corrected by the formation of equations of condition and their solution, as in the case of the satellites of Uranus. The following are the principal results :—

$$N = 184^{\circ} 32' + 0^{\circ} 0095t$$

$$I = 120^{\circ} 05' + 0^{\circ} 0005t$$

t being counted from 1883.0.

Comparing the observations of 1881–84 with those of Lassell and Marth, the periodic time is found to be 5.876839 mean solar days; that deduced by Mr. Hind, which was adopted by Prof. Newcomb in his tables, is 5.8769 days; the small difference would produce a change of about 5° in the true position of the satellite in its orbit at the beginning of next century, and Prof. Hall leaves it to future observations to decide whether his correction is required.

The values of the mass of Neptune from his measures at different oppositions, and from those of Lassell and Marth and of Holden differ sensibly. The mean result from Hall's own observations is $\frac{1}{19092}$; he remarks that his distances are generally smaller than those of other observers, and believes that, in order to eliminate the effect of such personal equation from the determination of the mass of a planet, the only way will be to increase the number of observers and to take a mean of their results. Hall's value approaches nearly to that found by Prof. Newcomb, $\frac{1}{19380}$.

On favourable nights examinations of the region about Neptune were made, but no other satellite was detected.

VARIABLE STARS (1).—The following Greenwich times of geocentric minima of Algol have been deduced from elements corrected by the later observations of Schmidt:—

		h.	m.			h.	m.
November	8	...	15 7	December	7	...	7 16
	11	...	11 56		18	...	18 33
	14	...	8 45		21	...	15 22
	17	...	5 34		24	...	12 11
	28	...	16 49		27	...	9 0
December	1	...	13 38		30	...	5 49
	4	...	10 27				

(2) R Leonis will now be approaching a maximum; there would appear to be indications of a sensible perturbation in the period during the last twenty years or more. (3) V Piscium, one of Argelander's supposed variables, is now favourably placed for observation; its estimates vary from 6.7 m. to 9 m.; the position of this star for 1885.0 is in R.A. 1h. 48m. 18s., Decl. + 8° 12' 9". (4) Argelander's formula of sines makes a maximum of *Mira Ceti* due on December 19, but it may probably occur earlier.

ASTRONOMICAL PHENOMENA FOR THE WEEK, 1885, OCTOBER 11-17

(For the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on October 11

Sun rises, 6h. 20m.; souths, 11h. 46m. 41.8s.; sets, 17h. 14m.; decl. on meridian, 7° 11' S.; Sidereal Time at Sunset, 18h. 36m.

Moon (three days after New) rises, 9h. 40m.; souths, 14h. 28m.; sets, 19h. 13m.; decl. on meridian, 15° 18' S.

Planet	Rises h. m.	Souths h. m.	Sets h. m.	Decl. on meridian
Mercury	5 55	11 35	17 15	4 35 S.
Venus	10 17	14 23	18 29	21 28 S.
Mars	0 11	7 49	15 27	17 44 N.
Jupiter	3 54	10 16	16 38	3 38 N.
Saturn	21 8*	5 16	13 24	22 18 N.

* Indicates that the rising is that of the preceding day.

Phenomena of Jupiter's Satellites

Oct.	h. m.		Oct.	h. m.	
12	4 37	IV. ecl. disap.	14	4 50	I. tr. egr.
13	4 51	I. ecl. disap.	16	4 7	II. tr. ing.

The Phenomena of Jupiter's Satellites are such as are visible at Greenwich.

Oct.	h.	
11	12	Venus in conjunction with and 6° 23' south of the Moon.
16	10	Mercury in superior conjunction with the Sun.
17	2	Venus at greatest distance from the Sun.

GEOGRAPHICAL NOTES

ACCORDING to the report by Lieut. Wissmann on his last exploration in the Congo region, the Lower Kassai constitutes a magnificent fluvial artery, frequently of enormous breadth, and leads without obstacle into the heart of the new Congo State. Between the station of Kwamouth and the confluent of the Lulua and above the station of Luluaburg the Kassai, with a breadth of about 600 kilometres, is everywhere open for navigation. It runs through a country of wonderful fertility, presenting

alternately plains and virgin forests, and inhabited by a dense population. With about one exception the travellers have been received everywhere with eagerness by peaceable tribes, all disposed to trade. During the forty-two days employed in the voyage from Luluaburg to Kwamouth the health of the expedition was excellent. There was no loss of life, except that two natives were drowned in the rapids of the Lulua. The five white men and the 200 Negroes of the Expedition arrived all in good health at Léopoldville on July 16.

THE current number of *Petermann's Mittheilungen* contains the conclusion of M. Thoroddsen's paper on a lava desert in the interior of Iceland. It supplies certain geographical and scientific observations of the writers, such as the superficial dimensions, height, &c., hydrography, climate, geology, volcanoes, glaciers, botany, and zoology of the interior of Iceland. Herr Hasenstien describes, with a large map, Bohndorff's journeys in Central Africa between 1874 and 1883. The usual geographical information for the month, and account of the literature concludes the number.

THE most interesting contribution, however, to *Petermann* this month is a short prefatory sketch on the history of the great geographical house of Perthes of Gotha, September 11 being the centenary of its foundation. In 1801 the first geographical work was published by Perthes, and in 1809 he published a large atlas by Prof. Heusinger. Under the second proprietor, Wilhelm Perthes, who was head of the establishment between 1816 and 1853, the publications of the house assumed their geographical and cartographical character. In 1817 appeared the first edition of Stieler's Atlas, consisting of fifty maps, and between 1823 and 1831 a supplement of twenty-five more was added. This Atlas has now for nearly seventy years been the principal work published by the house of Perthes. It has been kept up to date, and the number of the maps, which in 1862 was 84, grew in 1871 to 90, and in 1879 to 95. The total number of maps, old and new, amounts to 197. Besides Stieler, Berghans (1797-1884), Spruner and Sydow supported Perthes. In 1832 Berghans's great atlas of the extra-European countries appeared. It was a financial failure, but it carried the name of the house abroad, and laid the foundation of its world-wide fame. In 1838 the publication of the same author's Physical Atlas in 93 maps was completed. Between 1837 and 1852 Spruner's Historical-geographical Atlas appeared, and was followed by various editions. Wilhelm Perthes died in 1853, and Bernhardt Perthes reigned in his stead for only four years, leaving a posthumous son, the present Justus Perthes. Petermann, who died in 1878, commenced his celebrated *Mittheilungen* in 1855. The publications of the house since that date are well-known to all geographers; Behm's "Geographical Year-Book," and Behm and Wagner's "Population of the Globe," are works of world-wide celebrity.

ON Friday last, after an absence of nearly three years, the Danish exploration expedition to the east coast of Greenland, under Lieutenants Holm and Garde, returned to Copenhagen in the ship *Constance* from Godthaab. We have from time to time given particulars of the progress of this expedition, the chief object of which was to penetrate as far north along the east coast as possible, and to attempt to reach certain native settlements known to exist between latitudes 65° and 66° N. The expedition has fulfilled all expectations, besides the collection of a valuable scientific material, Lieut. Holm having wintered in lat. 65°-66°, the highest point reached being lat. 66° 08' N., the northernmost ever reached by Europeans. Lieut. Holm is stated to have made some very valuable geographical and ethnographical discoveries, having spent last winter among East Greenlanders never before visited by Europeans. He has named the stretch of coast explored, King Christian IX.'s Land.

A WRITER who has travelled widely through Tonquin and Southern China describes, in a recent number of the *République Française*, the route from Lao-Kai, on the Red River, to Mengtze in Yunnan. Premising that the river from the mouth to Lao-Kai, on the Tonquin border, is tolerably well known, he refers to the various routes for getting into South-Western China, but is far from enthusiastic about any of them, although he thinks that France in Tonquin has as much chance of getting the China trade as any of her rivals in the south. The writer then describes the route along the river from Lao-Kai to Manhao, the head of the Red River navigation. From this point the road to the plateau of Yunnan is said to be mountainous and